

TDLAS Test-stand Diagnostics Development for Velocity, Temperature, Efficiency, and Erosion for Space Shuttle Main Engines, Phase I

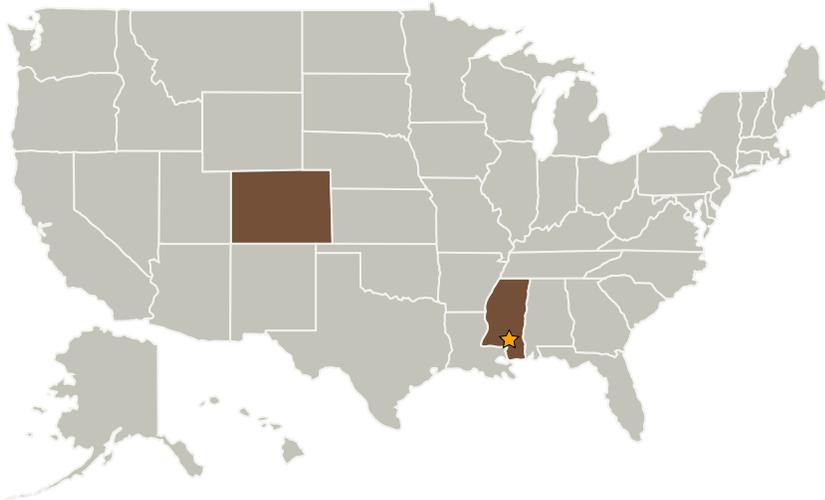
Completed Technology Project (2007 - 2008)



Project Introduction

We propose here to develop tunable diode laser spectroscopy as a diagnostic for the Space Shuttle main engines during test stand operations. These engines represent the state-of-the-art in rocket engine propulsion systems, and as such, they stretch available technology to the limit. The engines must be test-fired through several cycles prior to incorporation into the shuttle for flight operations. Diagnostic tests for the engines are extremely limited due to the harsh nature of the environment. We propose to develop diode laser instrumentation in order to measure temperature, velocity, surface erosion, and possibly efficiency in real time with an update rate of up to 1 kHz. The system technology will be based on wavelength multiplexed tunable diode laser spectroscopy which Zolo and Stanford have jointly developed to diagnose many types of aeropropulsion systems including SCRAMJETs, augmentors, and pulsed detonation engines. This project represents the first time that the wavelength-multiplexed technology will be tested on full-scale rocket engines.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|-------------|-----------------------------------|
| ★Stennis Space Center(SSC) | Lead Organization | NASA Center | Stennis Space Center, Mississippi |
| Zolo Technologies, Inc. | Supporting Organization | Industry | Boulder, Colorado |

| Primary U.S. Work Locations | |
|-----------------------------|-------------|
| Colorado | Mississippi |

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Andy Sappey

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.5 Propulsion Flowpath and Interactions